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## DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention]This invention relates to the base oil for polyether system lubricating oils. It is related with the base oil for polyether system lubricating oils excellent in water solubility and lubricity in more detail.

[0002]

[Description of the Prior Art]As for the base oil used for drainage system lubricating oils, such as metalworking fluid used for processing of polish of cutting oil, a sliding-surface lubricating oil, rolling oil, a drawing oil, press oil, a forge oil, an aluminum disk, and a silicon wafer, cutting, etc., and water-glycol system hydraulic oil, water solubility and lubricity are required.

Conventionally, polyether system base oil has been used as base oil of a drainage system lubricating oil. However, much polyether system base oil in which water solubility is made good runs short of lubricity. Much polyether system base oil deteriorates easily by heat or oxygen.

[0003]

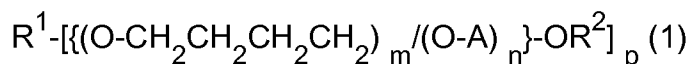
[Problem(s) to be Solved by the Invention]An object of this invention is to provide the base oil for lubricating oils excellent in water solubility, lubricity, and thermal stability.

[0004]

[Means for Solving the Problem]This invention persons reached this invention, as a result of inquiring wholeheartedly in view of the above-mentioned problem. Namely, a lubricating oil composition this invention is characterized by that comprises the following.

Base oil for lubricating oils; containing polyether (E) whose HLB it is expressed with a following general formula (1), and is 8.5 or more and whose weight average molecular weight is 500-10,000, and this base oil for lubricating oils.

One or more sorts of additive agents chosen from water, an antioxidant, an extreme pressure additive, a rust-proofer, a defoaming agent, and an emulsifier.



1 - a trivalent hydrocarbon group of the carbon numbers 1-24, and  $R^2$   $R^1$  in [type An alkyl group of the carbon numbers 1-4, A is one or more sorts chosen from an alkylene group of the carbon numbers 1-4 except 1 and 4-butylene group, and weight average molecular weight of (E) is one or more integers with which p fulfills an integer of 1-3 and m and n fill 500-10,000, and when there are more than one, it may be the same or may differ. It may join together at random or a oxytetramethylen group ( $O-CH_2CH_2CH_2CH_2$  group) and an oxyalkylene group (O-A group) may be combined with block like shape. ][0005]

[Embodiment of the Invention] $R^1$  in said general formula (1) is 1 - the trivalent hydrocarbon group of the carbon numbers 1-24, and a straight chain or the aliphatic hydrocarbon group of branching, an aromatic hydrocarbon group, and an alicyclic hydrocarbon group are mentioned. Water solubility worsens that a carbon number is 25 or more. As a straight chain or a univalent aliphatic hydrocarbon group of branching, for example, an alkyl group (the propyl group of a methyl group, an ethyl group, n-, and i-) A butyl group, a pentyl group, a hexyl group, a heptyl group, an octyl group, a nonyl group, A decyl group, an undecyl group, the dodecyl, a tridecyl group, a tetradecyl group, a pentadecyl group -- passing -- a PUTADESHIRU group, an octadecyl group, and a nonadecyl group. An eicosyl group, a heneicosyl group, a docosyl group, a tricosyl group, and a tetracosyl group, and unsaturated hydrocarbon groups (an alkenyl group or an alkynyl group.) of; cis- or trans-, such as a 2-ethylhexyl group For example, an ethenyl group, 1-, 2- and an iso-propenyl group, a butenyl group, A pentynyl group, a hexenyl group, a PEPUTENIRU group, a nonenyl group, a decenyl group, An undecenyl group, a dodecenyl group, a tridecenyl group, a tetra decenyl group, a penta decenyl group, a hexa decenyl group, a heptadecenyl group, an octadecenyl group, a nona decenyl group, an eicosenyl group, a heneicosenyl group, a docosenyl group, a tricosenyl group, a tetracosenyl group, etc. -- etc. -- it is mentioned.

[0006]As a straight chain or a divalent aliphatic hydrocarbon group of branching, the residue excluding two hydroxyl groups from aliphatic series diol is mentioned. as aliphatic series diol -- for example, saturated-fat fellows diol (ethylene glycol.) Propylene glycol, 1,4- and 1,2-butanediol, neopentyl glycol, 1,6-hexanediol, 1, and 2- and 1, 8-octanediol, 3-methyl-1,5-pentanediol, 2 and 2, 4-trimethyl 1, 3-pentanediol, 2,2-dimethyl- 1,3-propanediol, 2-butyl-2-ethyl-1,3-propanediol, 2,5-dimethylhexane 2,5-diol, etc., Unsaturation aliphatic series diol (2-butene-1, 4-diol, 3-methyl-3-butene-1, 2-diol, etc.) etc. are mentioned.

[0007]As a straight chain or a trivalent aliphatic hydrocarbon group of branching, the residue excluding three hydroxyl groups from aliphatic series triol is mentioned. as aliphatic series triol -- for example, saturated-fat fellows triol (glycerin.) 1,2,3-butanetriol, 1 and 2, 3-pentanetriol, 2-

methyl-1,2,3-propanetriol, 2-methyl-2,3,4-butanetriol, 2-ethyl-1,2,3-butanetriol, 2 and 3, 4-pentanetriol, 2,3,4-hexanetriol, 4-propyl-3,4,5-heptanetriol, 2,4-dimethyl- 2,3,4-pentanetriol, pentamethylglycerin, Unsaturation aliphatic series triol (2-hexene-1,4,5-triol, 3-hexene-1,2,5-triol, etc.), such as 1,2,4-butanetriol, 1,2,4-pentanetriol, trimethylolethane, and trimethylolpropane, etc. are mentioned.

[0008]As a univalent aromatic hydrocarbon group, the aromatic hydrocarbon group of the carbon numbers 6-24, for example, a phenyl group and an alkyl aryl group (o-, m-, or p-methylphenyl group.) m- or p-dimethylphenyl group, 2, 6-dimethylphenyl group, o-, m- or p-ethyl phenyl group, a p-n-buthylphenyl group, Aralkyl groups, such as p-octyl phenyl group and p-nonylphenyl group (benzyl, phenethyl group, etc.), Substitution aralkyl groups (o-, m- or p-methylbenzyl group, a p-n-butylphenethyl group, etc.), styryl phenyl groups (mono- \*\*\*\*\* JISUCHIRIRU phenyl group etc.), benzylphenyl groups (mono- \*\*\*\*\* dibenzyl phenyl group etc.), etc. are mentioned. As a divalent aromatic hydrocarbon group, the residue excluding two hydroxyl groups from the dihydric phenol of the carbon numbers 6-24 is mentioned. As dihydric phenol, monocycle diol (catechol, resorcinol, hydroquinone, etc.) and bisphenols (bisphenol A, the bisphenol F, etc.) are mentioned, for example. As a trivalent aromatic hydrocarbon group, the residue excluding three hydroxyl groups from trivalent phenol of the carbon numbers 6-24 is mentioned. As trivalent phenol, pyrogallol, phloroglucine, etc. are mentioned, for example.

[0009]As an alicyclic hydrocarbon group, 1 - the residue excluding all the hydroxyl groups from trivalent alicyclic alcohol are mentioned. as 1 - trivalent alicyclic alcohol -- for example, a monooar (cyclopentanol.) diol (1,4-cyclohexanediol.), such as cyclohexanol Triol (1,3,5-cyclohexanetriol, 1,3,5-cyclohexane TORIMETA Norian, etc.), such as 1,4-cyclohexane dimethanol, hydrogenation bisphenol A, and the hydrogenation bisphenol F, etc. are mentioned.

[0010]The aliphatic series of the aliphatic series of the carbon numbers 1-20 or an alicyclic hydrocarbon group, and also the carbon numbers 1-13 or an alicyclic hydrocarbon group, especially an aliphatic hydrocarbon group are [ among these ] preferred.

[0011] $R^2$  in said general formula (1) is a straight chain of the carbon numbers 1-4, or an alkyl group of branching, for example, a methyl group, an ethyl group, n- and an iso-propyl group, n-, iso-, sec-, and a tert-butyl group are mentioned. a with a carbon number of three or less thing is [ among these ] preferred -- further -- desirable -- an ethyl group and n-propyl group -- and [ especially ] it is a methyl group. Water solubility worsens that a carbon number is five or more.

[0012]A in a general formula (1) is one or more sorts chosen from the alkylene group of the carbon numbers 1-4 except 1 and 4-butylene group. as this alkylene group -- a carbon number -- 1-4 -- alkylene group of 2-4, for example, methylene group, ethylene, 1,2- and 1,3-propylene group, 1, 2-, 2, 3-, 1, and 3- and an iso-butylene group are mentioned preferably. one desirable

[ among these ] -- a 1,2-propylene group and a 1,2-butylene group -- and [ especially ] it is ethylene.  $p$  in a general formula (1) is an integer of 1-3, and is equivalent to the valence of  $R^1$ . 1 or 2 is preferred.

[0013]The HLB value of (E) in this invention is usually 8.5 or more. It is 9-17 preferably and is 10-15 still more preferably. If the HLB value of (E) is smaller than 8.5, water solubility will worsen. An HLB value is a value by an Oda style based on an organic key map, and the calculation method is "art of emulsification and solubilization", for example. It is indicated by [Showa 51 and Kougaskutosho Co.]. About the organic value and inorganic value for drawing an HLB value, they are "the organic key map-foundation and application -." [Showa 59 Sankyo Publishing Co., Ltd.] It is computable using the inorganic basis table (report value of Showa 49, Fujita and others) of a statement.

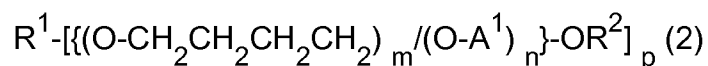
[0014]It is based on weight-average-molecular-weight (Mw) [gel-permeation-chromatography (GPC) measurement of (E). The following is also made the same. ] is 500-10,000 and is 700-5,000 preferably [ it is desirable and ] to 600-6,000, and a pan. By less than 500, lubricity is poor, and if 10,000 is exceeded, kinetic viscosity will become high too much.

[0015]Although  $m$  and  $n$  in a general formula (1) should just be one or more integers of the range with which the above-mentioned molecular weight of (E) is filled, From a lubricative and water-soluble point. Polyoxyalkylene chain [  $(O-CH_2CH_2CH_2CH_2)$  The content of the oxytetramethylen group  $(O-CH_2CH_2CH_2CH_2)$  group) in sum total] of  $m$  and  $n$  (O-A) 5-45-mol %, It is especially preferred that it is 10-40-mol the value used as %.

[0016]It is preferred that (E) has a random connecting part of a oxytetramethylen group  $(O-CH_2CH_2CH_2CH_2)$  group) and other oxyalkylene groups (O-A group) at the point that the flowability in low temperature is excellent. It is preferred that more than 80 mass % exists in a random connecting part among the oxytetramethylen groups which constitute (E).

[0017]Although the polyether system lubricating oil of this invention uses (E) as an essential ingredient, other polyether [polyether etc. 1 of  $R^1$  in a general formula (1) and  $R^2$  or whose both are hydrogen atoms] may be contained. Below 20 mass % of the content is preferred.

[0018]As a desirable thing of (E), what is shown, for example with a following general formula (2) is mentioned.



a thing [ in / in  $R^1$ ,  $R^2$ ,  $p$ ,  $m$ , and  $n$  / a general formula (1) ] -- the same --  $A^1$  is an alkylene group of carbon numbers 2-4 other than 1 and 4-butylene group. This under existence of a catalyst to 1 - trivalent alcohol or phenol (e) shown by  $R^1[-OH]_p$  A tetrahydrofuran. The hydroxyl group of the end of the polyether (b) obtained by adding the alkylene oxide (following

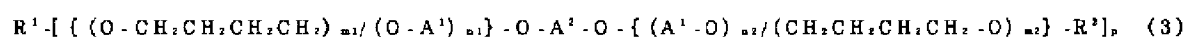
and  $A^1O$  and brief sketch) of carbon numbers 2-4 other than (the following, THF and a brief sketch) and one sort, or two sorts or more of THF(s) (random and/or block addition) is alkyl-ether-ized, and can be manufactured. As  $A^1O$  to add, ethylene oxide (the following, EO, and brief sketch), propylene oxide (the following, PO, and brief sketch), 1,2-, 2,3- and 1,3-butylene oxide, isobutyleneoxide, etc. are mentioned, for example. one desirable [ among these ] -- PO, 1, and 2-butylene oxide -- and [ especially ] it is EO. These may use together, it may be random or a block may be sufficient as polymerization form. As for the number of addition mols of 1-100, and  $A^1O$  (p sum totals of n), 5-150 are [ the number of addition mols of THF (p sum totals of m) ] preferred.

[0019]as the catalyst in the case of carrying out addition copolymerization of the THF to independent addition or  $A^1O$  -- for example,  $BF_3$ ,  $BCl_3$ ,  $AlCl_3$ ,  $FeCl_3$ , Lewis acid and those complex [ , for example,  $BF_3$  ether complexes, such as  $SnCl_3$ ,  $BF_3$  tetrahydrofuran complex ( $BF_3$  and THF)];  $H_2SO_4$ , Proton acid, such as  $HClO_4$ ; Perchlorate;  $Ca(ClO_4)_2$  of alkaline metals, such as  $KClO_4$  and  $NaClO_4$ , The perchlorate of alkaline-earth metals, such as  $Mg(ClO_4)_2$ ; the perchlorate of metal other than [ said ] aluminum( $ClO_4$ )<sub>3</sub> etc., etc. are mentioned. They are  $BF_3$  ether complex and  $BF_3$  tetrahydrofuran complex ( $BF_3$  and THF) preferably among these. As a catalyst in the case of carrying out independent addition of the  $A^1O$ , The publicly known catalyst used may be sufficient and Usually, the above-mentioned alkali catalyst besides a catalyst, for example, a hydroxide [hydroxide of alkaline metal [ , such as KOH, NaOH, CsOH, and  $Ca(OH)_2$ , ] or alkaline-earth metals], etc.; oxide ( $K_2O$ .); alkaline metals (Na, K, etc.) and the hydrides of those (NaH, KH, etc.), such as an oxide of alkaline metals, such as CaO and BaO, or alkaline-earth metals; amines, such as triethylamine and trimethylamine, etc. are mentioned. They are KOH, NaOH, CsOH,  $BF_3$  ether complex, and  $BF_3$  tetrahydrofuran complex ( $BF_3$  and THF) preferably [ among these ].

[0020]The above-mentioned alkyl ether can be manufactured by making (b) react to alkyl halide (carbon numbers 1-4) under existence of alkali (hydroxide of alkaline metals, such as KOH, NaOH, and CsOH, etc.). The alkyl group of the carbon numbers 1-4 is the same as said  $R^2$ . As for the quantity of alkyl halide, 1 / 1 - 5/1, especially 1.2 / 1 - 4/1 are preferred to the hydroxyl group of (b) at equivalent ratio. As for the addition of alkali, 1 / 1 - 10/1, especially 1.2 / 1 - 5/1 are preferred to the hydroxyl group of (b) at equivalent ratio. What is shown by a general formula (3) is contained in other examples of (E).

[0021]

[Formula 1]



[0022] A<sup>1</sup> in [type, R<sup>1</sup>, R<sup>2</sup>, and p A general formula (1), if it can set to (2) -- the same -- 0 or one or more integers with which A<sup>2</sup> fills the alkylene group of the carbon numbers 1-4, and m1 and m2 fill formula m1+m2=m, and n1 and n2 express 0 or one or more integers with which formula n1+n2=n-1 is filled. (E) shown by] general formula (3), 1 shown by formula R<sup>1</sup>{[(O-CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>)<sub>m1</sub>/(O-A<sup>1</sup>)<sub>n1</sub>]} OH] <sub>p</sub> - trivalent alcohol (e<sup>1</sup>) (R<sup>1</sup>[OH] <sub>p</sub>.) Or the THF. And/. Or the monoar (e<sup>2</sup>) (R<sup>2</sup>OH.) shown by an A<sup>1</sup>O addition and formula R<sup>2</sup>{(O-CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>CH<sub>2</sub>)<sub>m2</sub>/(O-A<sup>1</sup>)<sub>n2</sub>]} OH Or its THF, and/or A<sup>1</sup>O addition [(e<sup>1</sup>) and (e<sup>2</sup>) can be manufactured by making] which may be the same or may differ react to the dihalo alkane of the carbon numbers 1-4 under existence of alkali, and etherifying it (joint). The alkali used for the catalyst used for A<sup>1</sup>O addition and/or THF addition and etherification can use the same thing as the above. the jib which is equivalent to dichloromethane, 1,2-dichloroethane, 1,2- and 1,3-dichloro propane, 1,2-, 1,3-, 1,4-, 2,3-dichloro butane, and these as the above-mentioned dihalo alkane, for example -- the ROM alkane is mentioned. As for the equivalent ratio of dihalo alkane/[(e<sup>1</sup>) and sum total of the hydroxyl group of (e<sup>2</sup>)], 0.5 / 1 - 0.4/1 are preferred.

[0023] Even when base oil for lubricating oils of this invention has good lubricity and it is independent, it is usable, but. As occasion demands, additive agents, such as an antioxidant, an extreme pressure additive, a rust-proofer, a defoaming agent, and an emulsifier, can be added, and it can dilute with water, and can be used as an emulsion type, a soluble type, and a solution type lubricating oil composition. These additive agents may use two or more sorts together.

[0024] As an antioxidant, it is a phenolic antioxidant. [For example, 2,4-dimethyl- 6-tert-butylphenol, 4,4-butylidenebis (6-tert-butyl metacresol), etc.] ; amine system antioxidant (for example, phenyl-alpha-naphthylamine, phenyl-beta-naphthylamine, etc.); -- dialkyl (carbon numbers 1-36) dithiophosphate zinc; -- diaryl (carbon numbers 2-36) dithiophosphate zinc; -- organic sulfide; -- organic seleno -- ide etc. are mentioned.

[0025] as an extreme pressure additive -- lead soap; (lead naphthenate etc.) -- a sulfur compound (sulfuration fatty acid, such as oleic acid sulfide,.) Sulfuration fatty acid ester, a sulfuration SUPAMU oil, terpene sulfide, dibenzyl die sulfide, Amine salt or alkali metal salt of alkylthio propionic acid of the carbon numbers 8-24, ;, such as amine salt or alkali metal salt of alkylthio glycolic acid of the carbon numbers 8-24, -- a chlorine compound (chlorination stearic acid.) ; phosphorus compounds (tricresyl phosphate.), such as a chlorinated paraffin and chloro naphtha xanthate Tributyl phosphate, tricresyl phosphite, n-butyldi-n-octyl phosphinate,

di-n-butyl dihexyl phosphonate, di-n-buthylphenyl phosphonate, a dibutyl phosphoro friend date, amine dibutyl phosphate, etc. are mentioned.

[0026]as a rust-proofer -- for example, organic amine (fatty amine.) of the carbon numbers 2-36 For example, a butylamine, octyl amine, lauryl amine, oleylamine; Alicyclic amine, For example, cyclohexylamine; Heterocyclic amine, for example, morpholine; alkanolamine, For example, monoethanolamine, triethanolamine, isopropanolamine, N-dimethylamino ethanolamine, ;, such as isopropanolamine;; -- alkylene oxide (carbon numbers 2-4 of alkylene group) adduct [ of organic amine ]; (PO or 1-10 mol of EO(s) addition of the above-mentioned amine, etc.) -- aliphatic carboxylic acid and amide of the carbon numbers 6-36 (caprylic acid, lauryl acid, and nonanoic acid.) dibasic acid (azelaic acid.) of the; carbon numbers 6-24, such as decanoic acid, oleic acid, and oleylamide alkenyl succinic acid, such as sebacic acid, dodecanedioic acid, and dimer acid, and amide of the; carbon numbers 6-36 (octenylsuccinic acid.) ; aromatic-carboxylic-acid (benzoic acid, p-tert butyl-benzoic-acid, nitrobenzoic acid, etc.);, such as dodecenyl succinic acid, penta decenyl succinic acid, and octenylsuccinic acid amide, -- amine salt of carboxylic acid of these, or alkali metal salt (caprylic acid caesium.) Sebacic acid potassium etc.; a cyclohexylamine night light, benzotriazol, mercaptobenzothiazole, N,N'-JISARICHI Liden 1,2-diaminopropane, alizarin, etc. are mentioned. Aliphatic carboxylic acid and amide of the carbon numbers 6-36, alkenyl succinic acid, and amide of the carbon numbers 6-36 also have a function as an oiliness improver.

[0027]Polyorganosiloxanes (for example, poly dimethylsiloxane etc.) etc. are mentioned as a defoaming agent.

[0028]As an emulsifier, anion activators, such as nonionic surface active agent; petroleum sulfonate, such as polyoxyethylene (degrees of polymerization 4-20) monoalkyl ether (carbon numbers 8-22 of an alkyl group), and alkyl (carbon numbers 5-36) benzenesulfonic acid alkali metal salt, are mentioned.

[0029]A content of base oil for lubricating oils which consists of (E) is 10 - 50 mass % preferably [ it is desirable and ] to 5 - 90 mass % and a pan among a lubricating oil composition of this invention. a content of water -- desirable -- below 95 mass % -- further -- desirable -- ten to 90 mass % -- it is 20 to 80 mass % especially preferably. Contents in a case of using an antioxidant are 0.0001 to 2 mass %, especially 0.001 to 1% preferably. A content in a case of using an extreme pressure additive of below 10 mass % is below 5 mass % still more preferably preferably. A content in a case of using a rust-proofer of below 25 mass % is five to 20 mass % still more preferably preferably. 1000 ppm or less of contents in a case of using a defoaming agent are 10-500 ppm still more preferably preferably. A content in a case of using an emulsifier of below 25 mass % is below 20 mass % still more preferably preferably.

[0030]Base oil for lubricating oils or a lubricating oil composition of this invention, It can use conveniently as base oil used for lubricating oils, such as metalworking fluid used for

processing of polish of cutting oil, a sliding-surface lubricating oil, rolling oil, a drawing oil, press oil, a forge oil, an aluminum disk, and a silicon wafer, cutting, etc., and water-glycol system hydraulic oil.

[0031]Base oil for lubricating oils or a lubricating oil composition of this invention is used diluting it with water as occasion demands (they are ten to 100 times at a mass basis), when using it as metalworking fluid and lubricant. It is preferred that dilute and a content of (E) uses especially so that a content of 0.5 - 3 mass % (especially one to 2 mass %) and a rust-proofer may become 0.2 - 2 mass % (especially 0.5 to 1 mass %).

[0032]

[Example]Although the following examples explain this invention in detail, this invention is not limited to this. Unless it mentions specially, the part in a sentence expresses a mass part.

(1) When appearance was uniform transparence by observing the appearance at 25 \*\* of the 2% solution of base oil, and water-soluble water solubility was water-soluble O and except it, it was judged to be x.

(2) Lubricative lubricity was evaluated using the oscillating frictional wear tester ( SRV tester by an OPUCHI mall company) by observing the coefficient of friction in the point contact (loads 200N and 300N) of a steel ball and a plane steel disk, and the diameter of an abrasion on a steel ball. A test condition is shown below.

<lubricative test condition> amplitude: -- 2-mm pitch: -- 50-Hz temperature: -- 30 \*\* time: -- coefficient-of-friction during 10 minutes: -- average oil film piece [ for / time / 10 minutes ]: -- the state where a coefficient of friction ( $\mu$ ) rose was seen.

x: : -- nothing ( $\mu$  stability) -- O \*\*: be ( $\mu$  a little change) and be ( $\mu$  change -- a large)

Abrasion: It is a wear diameter (mm) of a steel ball (SUJ-2) 10 mm.

(3) Thermal stability thermal stability was evaluated by observing the appearance of the sample oil under iron, aluminum, and copper existence and after holding for five days at 175 \*\*. Appearance was before and after the examination, when changeless, it was before and after thermal stability O and an examination, and when there was change of discoloration, condensation, etc., it was judged as those with change.

[0033]\*\* was taught to example of manufacture 1 glass autoclave for 64 copies (2 mol) of methanol, and 0.6 copy of KOH, and 522 copies (9 mol) of PO(s) were dropped over 10 hours at 110 \*\* from the resisting pressure dropping funnel. Then, at 130 \*\*, it was made to react for 7 hours and cooled. After cooling, an adsorption treatment agent [The KYO word 600 by Kyowa Chemical Industry Co., Ltd., and KYO word 1000. Suppose that it is the same as that of the following. It processed and filtered by ] and 4.5 mol of PO(s) addition of methanol was obtained after decompression drying. 293 copies, 483.2 copies (6.7 mol) of THF(s), and 18.4 copies of  $\text{BF}_3$  and THF(s) were taught among 4.5 mol of methanol PO additions obtained by glass autoclave, and 1936 copies (44 mol) of EO(s) were dropped over 5 hours at 35-50 \*\*

from the resisting pressure dropping funnel. Then, at 50 \*\*, it was made to react for 5 hours, and 290 copies (5 mol) of PO(s) were further dropped over 5 hours at 50 \*\*, and it cooled. 80 copies (2 mol) of powdered NaOH(s) were added, and 60.6 copies (1.2 mol) of methyl chlorides were dropped at 80 \*\*. Then, decompression (the pressure 1 - 50mmHg.) The decompression degree of the following examples is also the same. It carried out, the unreacted methyl chloride was removed, and liquid separation removal of superfluous NaOH and the generated salt was carried out by rinsing. The organic layer was processed and filtered by the adsorption treatment agent, and 2700 copies (E1) of end methyl ether ghosts of 5 mol of 44 mol of 6.7 mol of 4.5 mol of PO(s) block and THF(s)/EO(s) random and PO(s) block addition of methanol were obtained after decompression drying.

[0034]It is tridecanol by isotridecanol [Kyowa Hakko Kogyo Co., Ltd. to example of manufacture 2 glass autoclave. ] 200 copies (1 mol), 940.3 copies (13.1 mol) of THF(s), and 15.7 copies of  $\text{BF}_3$  and THF(s) were taught, and 1320 copies (30 mol) of EO(s) were dropped over 10 hours at 35-50 \*\* from the resisting pressure dropping funnel. Then, at 50 \*\*, it was made to react for 5 hours and cooled. 80 copies (2 mol) of powdered NaOH(s) were added, and 60.6 copies (1.2 mol) of methyl chlorides were dropped at 80 \*\*. Then, the methyl chloride unreacted as decompression was removed and liquid separation removal of superfluous NaOH and the generated salt was carried out by rinsing. The organic layer was processed and filtered by the adsorption treatment agent, and 2200 copies (E2) of end methyl ether ghosts of the 30 mol of 13.1 mol of THF(s)/EO(s) random addition of isotridecanol were obtained after decompression drying.

[0035]2, 2, 4-trimethyl 1, 146 copies (1 mol) of 3-pentanediol, 1008 copies (14 mol) of THF(s), and 15.8 copies of  $\text{BF}_3$  and THF(s) are taught to example of manufacture 3 glass autoclave, 1320 copies (30 mol) of EO(s) were dropped over 10 hours at 35-50 \*\* from the resisting pressure dropping funnel. Then, at 50 \*\*, it was made to react for 5 hours and cooled. 160 copies (4 mol) of powdered NaOH(s) were added, and 121.2 copies (2.4 mol) of methyl chlorides were dropped at 80 \*\*. Then, the methyl chloride unreacted as decompression was removed and liquid separation removal of superfluous NaOH and the generated salt was carried out by rinsing. The organic layer was processed and filtered by the adsorption treatment agent, and 1300 copies (E3) of end methyl ether ghosts of the 30 mol of 14 mol of THF(s)/EO(s) random addition of 2,2,4-trimethyl pentanediol were obtained after decompression drying.

[0036]25 copies (0.277 mol) of 1,4-butanediol, 811.1 copies (11.3 mol) of THF(s), and 6.2 copies of  $\text{BF}_3$  and THF(s) are taught to example of comparison manufacture 1 glass autoclave, 154.2 copies (3.5 mol) of EO(s) were dropped over 10 hours at 35-50 \*\* from the resisting pressure dropping funnel. Then, at 50 \*\*, it was made to react for 5 hours and cooled. After

adding 3.6 copies of NaOH aqueous solutions 48 more%, temperature up was carried out to 80 °C under decompression, and unreacted THF(s) were collected. Decompression drying was processed, filtered and carried out by the adsorption treatment agent. The inner 810 copy and 1.5 copies of potassium hydrates of the above-mentioned resultant which were obtained were taught to glass autoclave, and 188.8 copies (4.3 mol) of EO(s) were dropped over 10 hours at 105 °C from the resisting pressure dropping funnel. Then, at 130 °C, it was made to react for 5 hours and cooled. Furthermore 69.6 copies (1.74 mol) of powdered NaOH(s) were added, and 52.7 copies (1.04 mol) of methyl chlorides were dropped at 80 °C. Then, decompression (the pressure 1 - 50mmHg.) The decompression degree of the following examples is also the same. It carried out, the unreacted methyl chloride was removed, and liquid separation removal of superfluous NaOH and the generated salt was carried out by rinsing. The organic layer was processed and filtered by the adsorption treatment agent, and 930 copies (E'1) of end methyl ether ghosts of the 19.9 mol of 19.8 mol of THF(s)/EO(s) random block addition of 1,4-butanediol were obtained after decompression drying.

[0037]74 copies (1 mol) of n-butanol and 4.8 copies of KOH(s) were taught to example of comparison manufacture 2 glass autoclave, and the mixture of 915.2 copies (20.8 mol) of EO (s) and 916.4 copies (15.8 mol) of PO(s) was dropped over 15 hours at 110 °C from the resisting pressure dropping funnel. Then, at 130 °C, it was made to react for 10 hours and cooled. It processed and filtered by the adsorption treatment agent after cooling, and 1810 copies (E'2) of 15.8 mol of 20.8 mol of EO(s)/PO(s) random additions of n-butanol were obtained after decompression drying.

[0038]74 copies (1 mol) of n-butanol and 3.4 copies of KOH(s) were taught to example of comparison manufacture 3 glass autoclave, and 1281.8 copies (22.1 mol) of PO(s) were dropped over 15 hours at 110 °C from the resisting pressure dropping funnel. Then, at 130 °C, it was made to react for 10 hours and cooled. It processed and filtered by the adsorption treatment agent after cooling, and 1290 copies (E'3) of 22.1 mol of PO(s) additions of n-butanol were obtained after decompression drying.

[0039]It was considered as the base oil for lubricating oils of Examples 1-3, the comparative examples 1-3 (E1) - (E3) Examples 1-3 - (E'1) (E'3) the comparative examples 1-3. The result of Mw, HLB, the oil film piece under the load of 200N (an undiluted solution and 20 mass % solution) and 300N, a coefficient of friction and the diameter of an abrasion, the heat instability test, and a water-soluble examination is shown in Tables 1 and 2.

[0040]

[Table 1]

実施例				1	2	3
潤滑油				E 1	E 2	E 3
重量平均分子量				3050	2500	2530
H L B				12.96	10.14	10.36
潤滑性	原液	200N	油膜切れ	○	○	○
			摩擦係数	0.070	0.073	0.072
			摩耗痕径(mm)	0.430	0.435	0.433
		300N	油膜切れ	○	○	○
			摩擦係数	0.080	0.080	0.081
			摩耗痕径(mm)	0.450	0.455	0.466
	20 % 水溶液	200N	油膜切れ	○	○	○
			摩擦係数	0.110	0.115	0.115
			摩耗痕径(mm)	0.532	0.545	0.550
水溶性				○	○	○
熱安定性				○	○	○

[0041]

[Table 2]

比較例				1	2	3
潤滑油				E' 1	E' 2	E' 3
重量平均分子量				2330	1940	1370
H L B				7.88	11.83	4.84
潤滑性	原液	200N	油膜切れ	○	△	△
			摩擦係数	0.084	0.100	0.125
			摩耗痕径(mm)	0.430	0.443	0.518
		300N	油膜切れ	○	△	×
			摩擦係数	0.077	0.095	0.140
			摩耗痕径(mm)	0.480	0.495	0.695
	20 % 水溶液	200N	油膜切れ	—	△	—
			摩擦係数	—	0.130	—
			摩耗痕径(mm)	—	0.740	—
水溶性				×	○	×
熱安定性				○	黄変	黄変

[0042]All of Examples 1-3 using the polyether system lubricating oil of this invention are water solubility, and excellent in respect of lubricity (an undiluted solution and 20 mass % solution) and thermal stability. The comparative examples 1 and 3 have insufficient water solubility to it. The comparative examples 2 and 3 have insufficient thermal stability, and lubricity is inferior to an example in them.

[0043]

[Effect of the Invention]Since the base oil for lubricating oils of this invention is excellent in water solubility, lubricity, and thermal stability, It is very suitable as base oil for lubricating oils used for drainage system lubricating oils, such as metalworking fluid used for processing of polish of cutting oil, a sliding-surface lubricating oil, rolling oil, a drawing oil, press oil, a forge oil, an aluminum disk, and a silicon wafer, cutting, etc., and water-glycol system hydraulic oil.

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[Translation done.]